

Answer Sheet for M/C and True/False questions
Circle the correct answer

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B		
10	A	B		
11	A	B		
12	A	B		

Question 1: M/C

[10 Marks]

Answer the following questions by checking one answer that applies to the statement of the question. Put your Answer in the answer sheet provided.

1. _____ is a group of objects in the real world with the same properties and having independent existence.
 - ☐ a. An entity occurrence
 - ☒ b. An entity type
 - ☐ c. A relationship type
 - ☐ d. A relationship occurrence
2. The number of participants in a relationship is called the _____.
 - ☒ a. Cardinality
 - ☒ b. Degree
 - ☐ c. Multiplicity
 - ☐ d. Participation
3. A _____ attribute is an attribute that holds multiple values for each occurrence of an entity type.
 - ☐ a. Single
 - ☐ b. Derived
 - ☒ c. Multi-valued
 - ☐ d. Composite
4. The _____ key is the minimal set of attributes that uniquely identifies each occurrence of any entity type.
 - ☐ a. Composite
 - ☐ b. Surrogate
 - ☒ c. Candidate
 - ☐ d. Foreign
5. _____ is a top-down approach to defining a set of superclasses and their related subclasses.
 - ☐ a. Generalization
 - ☐ b. Aggregation
 - ☐ c. Composition
 - ☒ d. Specialization

Question 2: Relational Algebra

[8 Marks]

Consider the following relations Employee and Department with sample given data. Determine the result of the specified relational algebra operations in parts a, b, and c below.

R		S	
EmpId	DeptId	DeptId	DName
100	10	10	IT
110	10	11	Sc
120	12	12	Eng

a) $\Pi_{\text{DeptId}}(\text{Employee})$ 2 marks

DEPTID
10
10
12

1.5

b) Natural join: $R \bowtie S$ [3 marks]

DEPTID	EmpId	DName
10	100	IT
10	110	IT
12	120	Eng

3

c) Find number of employees working in each Dept in the given sample? Write down the relational algebra operation and the result of this operation? [3 points]

$\text{DeptId} \rightarrow \text{count EmpId} (\text{Employee})$

DEPTID	My count
10	2
12	1

6. A _____ relationship is a relationship type where the same entity type participates more than once in different roles.

- a. Binary
- ☒ b. Recursive
- c. Ternary
- d. Quaternary

7. A _____ entity type is an entity type that is existence-dependent on some other entity type.

- a. Strong
- b. Simple
- c. Composite
- ☒ d. Weak

8. In a _____ participation all entity occurrences are involved in a particular relationship.

- a. Optional
- ☒ c. Mandatory
- b. Disjoint
- d. Nondisjoint

T/F (Answer A for true & B for false)

- 9. A fan trap may exist where two or more 0..* relationships fan out from the same entity? **F**
- 10. The projection operation selects certain rows (tuples) of a relation. **F**
- 11. The Join operation is considered a basic operation of relational Algebra. **T**
- 12. If two relations R and S are joined together, then the non-matching tuples of both R and S are ignored in Left-outer join. **F**

Question 3: Entity Relationship modeling

[10 Marks]

In a company database you need to store information about employees (identified by social insurance number (SIN) with salary and phone number. Departments are identified by department number, with department name and budget. Children of an employee identified with name and age as attribute. Employees work in departments; each department is managed by one employee; a child can only be identified uniquely by name when the parent (who is an employee) is known. Assume that only one child's parent is working for the company. We are not interested in information about a child once the parent leaves the company.

- Draw E-R diagram for the given scenario showing entities, their attributes including the primary key, and relationships including multiplicity constraints in your model.
- Specify which entity is strong and which is weak? Justify your answer
- Show at least one Aggregation / Composition relationship and explain?
- Suppose that employees are classified into single and married, accommodate this into your diagram.

